C. D. McDONALD.

METAL WORKING MACHINE.

APPLICATION FILED OCT. 24, 1911.

1,039,565.

Patented Sept. 24, 1912.

7 SHEETS—SHEET 1.

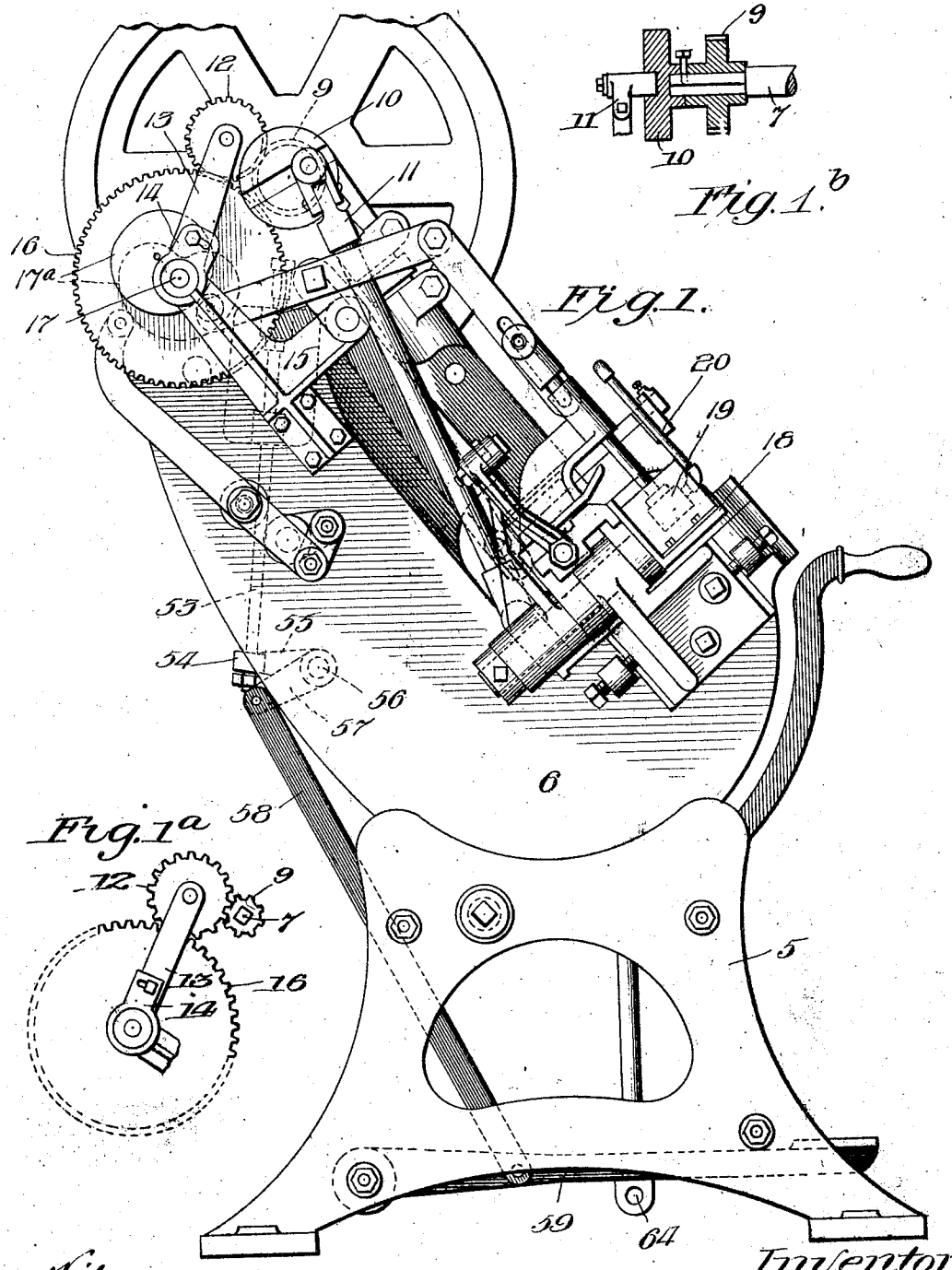


Fig. 1.




Fig. 1b

Fig. 1a




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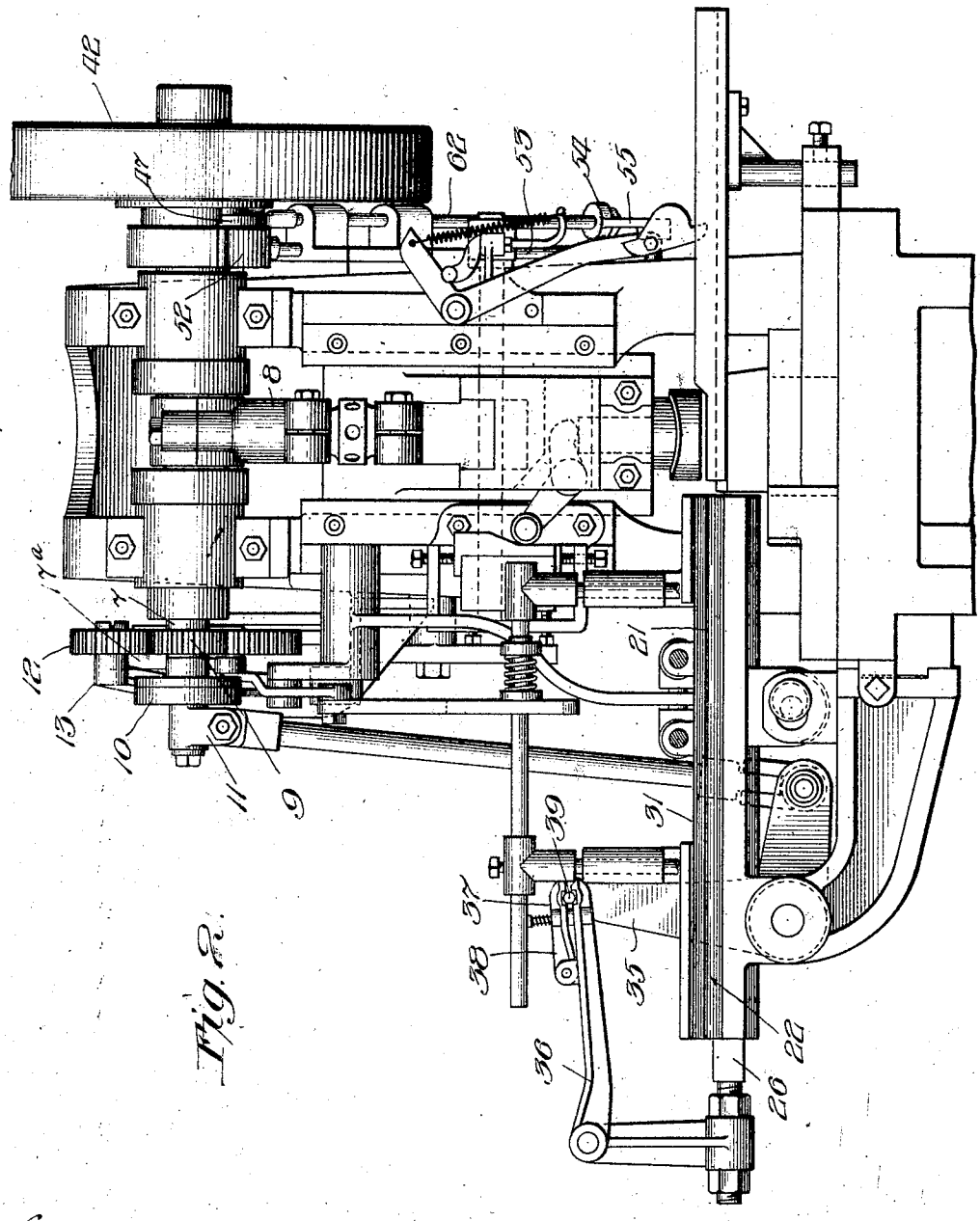


Fig. 2.

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7 SHEETS—SHEET 3.

Fig. 4.

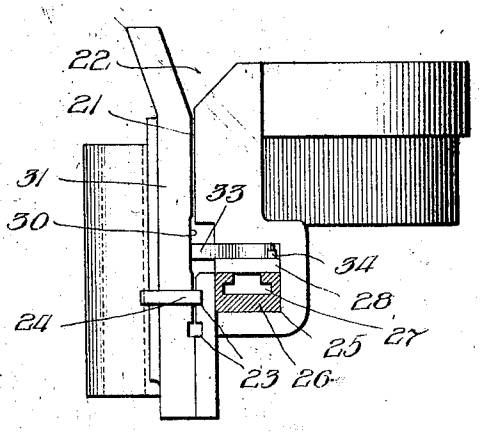



Fig. 5.

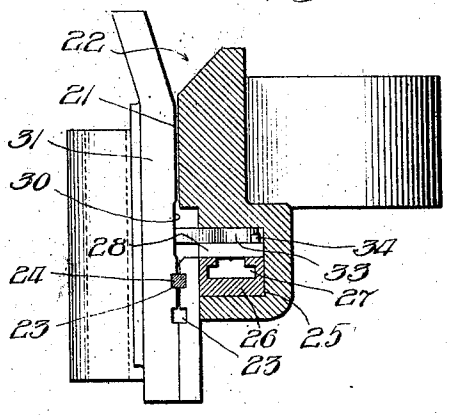
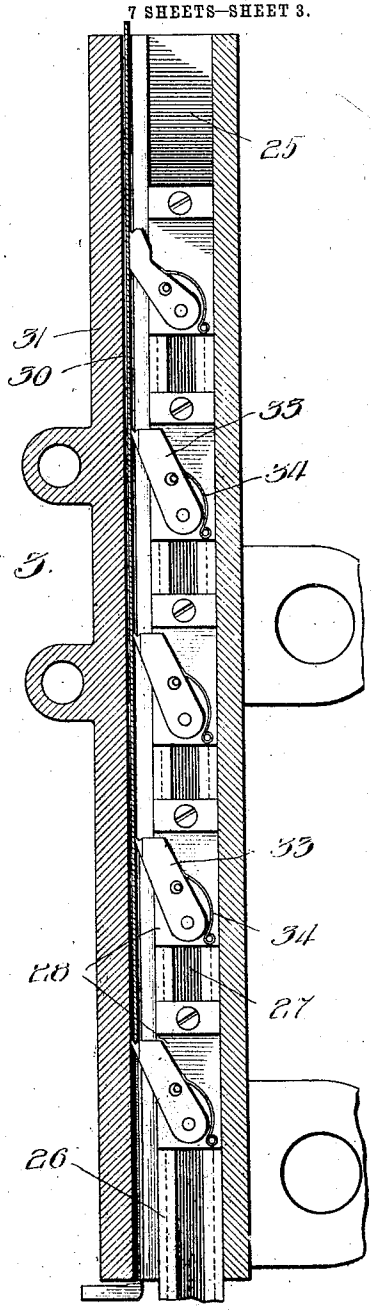



Fig. 3.

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7 SHEETS—SHEET 4.

Fig. 6.

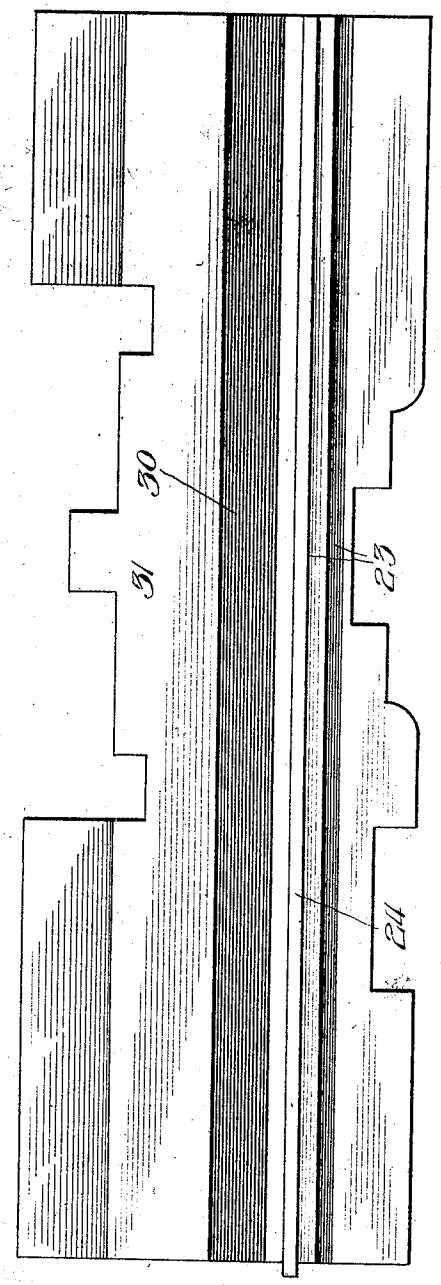



Fig. 8.

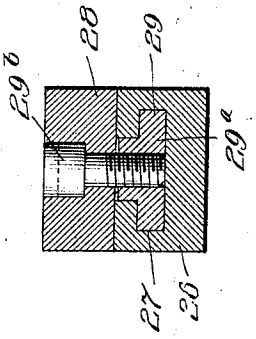
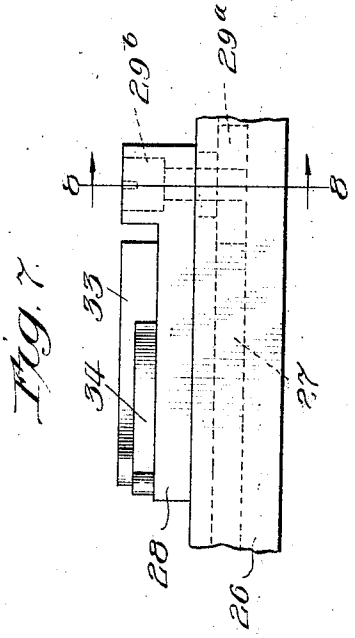



Fig. 7.

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7 SHEETS—SHEET 5.

Fig. 9.

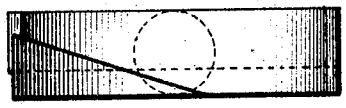
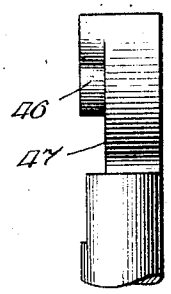


Fig. 11.



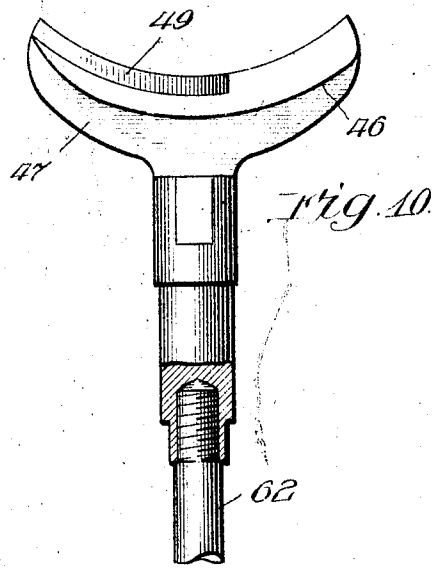
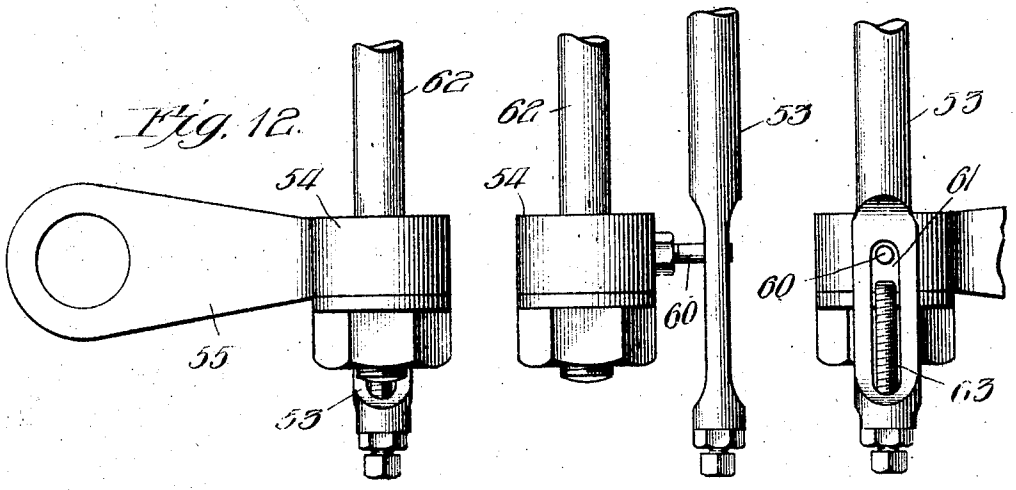




Fig. 10.

Fig. 13.

Fig. 14.

Fig. 12.

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7 SHEETS—SHEET 6.

Fig. 15.

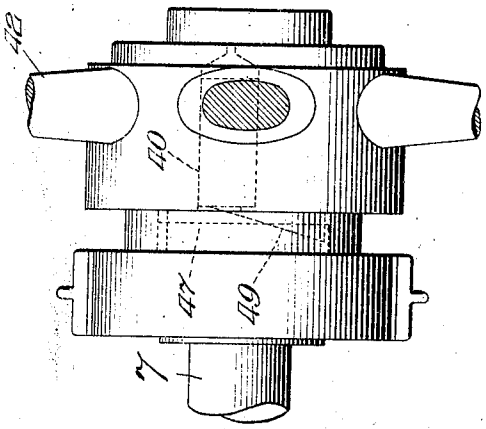



Fig. 16.

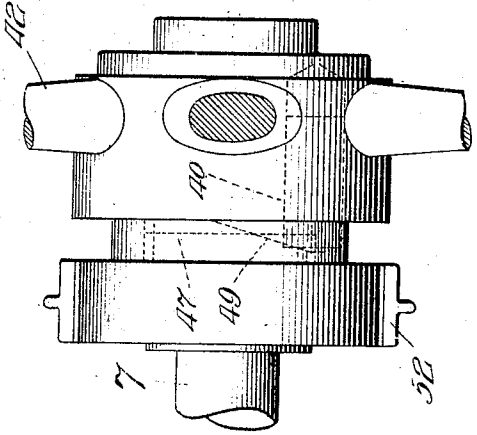
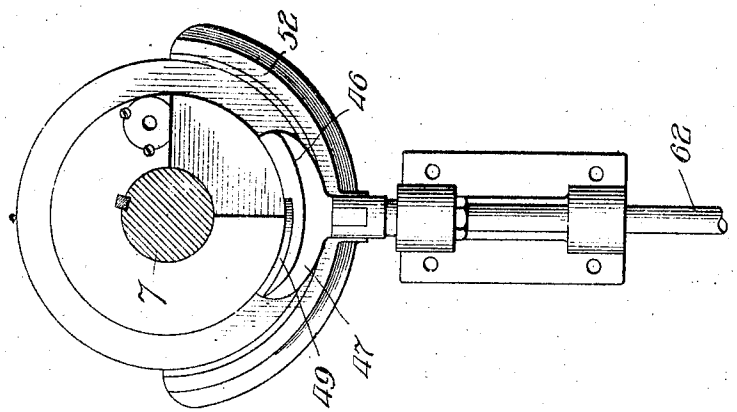



Fig. 17.

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7 SHEETS—SHEET 7.

Fig. 19.

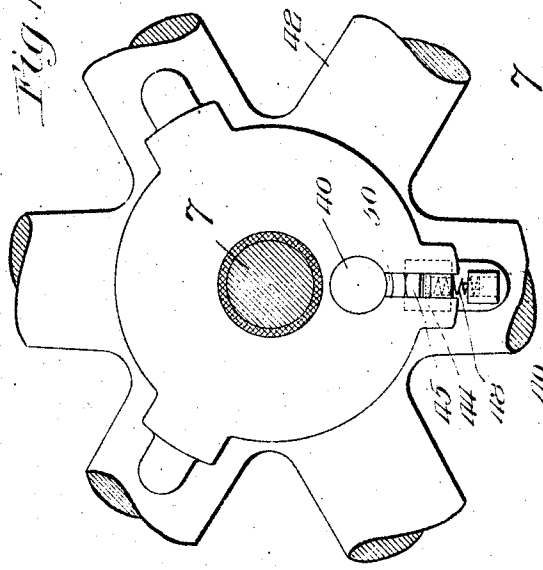



Fig. 20.

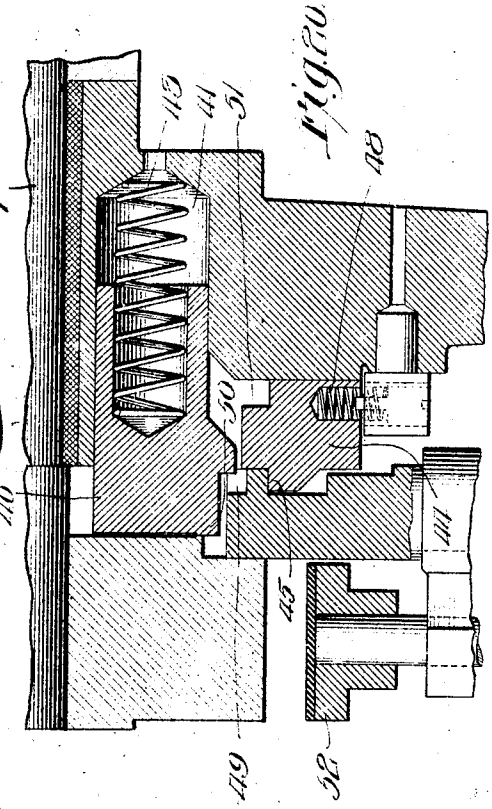
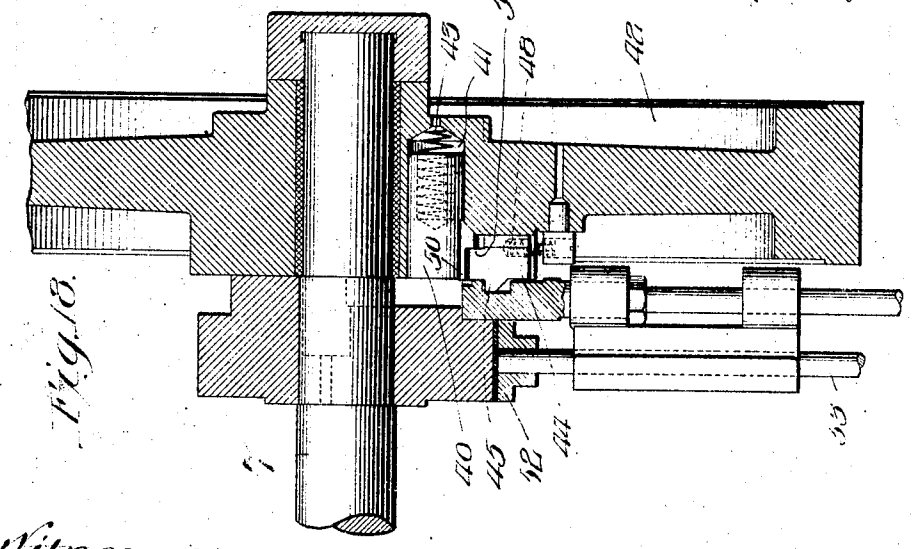



Fig. 18.

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# UNITED STATES PATENT OFFICE.

CHARLES D. McDONALD, OF CHICAGO, ILLINOIS, ASSIGNOR TO McDONALD MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## METAL-WORKING MACHINE.

1,039,565. Specification of Letters Patent. Patented Sept. 24, 1912.

Application filed October 24, 1911. Serial No. 656,391.

*To all whom it may concern:*

Be it known that I, CHARLES D. McDONALD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Metal-Working Machines, of which the following is a specification.

The present invention relates to certain improvements adapted more particularly for use with automatic die presses.

The objects of the present invention are; to provide an arrangement whereby a variation in the timing of the delivery and discharge mechanisms of the machine may be accomplished without any difficulty and without any material rearrangement of the operating parts; to provide means for adjusting the spacing of the teeth of the feed bar; to provide means for limiting the movement of the work into the groove in which it travels during the feeding operation, the same means insuring a rest for the work during the feeding operation, and to render said means adjustable to enable the same to accommodate itself to work of different widths; to provide a connection between the feed bar and the actuating mechanism therefor, which will separate under the force of undue strain, whereby the breaking or bending of any portion of the mechanism, by reason of a clogging or other stoppage of the feeding operation, will not occur; and to provide means for controlling the movements of the friction brake mechanism for the drive shaft, whereby said brake mechanism will be applied just prior to the unclutching of the drive shaft from the drive member and will be released just after the clutching of the drive shaft and the drive member.

The invention further consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of a machine with the mechanism of the present invention embodied therein; Fig. 1ª, a detail showing a different sized gear in place upon the drive shaft from that shown in Fig. 1, and showing the manner in which the intermediate gear adjusts itself to accommodate the changes in the size of gears upon the drive shaft; Fig. 1ᵇ, a detail section of the end of the drive shaft; Fig. 2 is a face view of the upper portion of the machine illustrated in Fig. 1; Fig. 3 is a detail, partly in section, of the feed bar and the mounting therefor; Fig. 4 is an enlarged detail, partly in section, showing the feed bar and the channel in which the work travels during the feeding operation, together with the adjustable means for limiting the movement of the work in said channel; Fig. 5 is a view similar to Fig. 4, with certain of the parts in section; Fig. 6 is a plan view of the plate in which the feed bar travels; Fig. 7 is an enlarged detail of the feed bar and one of the fingers, showing the connection between said finger and the bar; Fig. 8 is a section on line 8—8 of Fig. 7, looking in the direction of the arrows; Figs. 9, 10 and 11 are details of the trip member for the clutch mechanism; Figs. 12, 13 and 14 are details of the connection between the clutch mechanism and the brake mechanism; Fig. 15 is a face view of the brake mechanism and the trip mechanism for the clutch; Figs. 16 and 17 are plan views of the parts shown in Fig. 15, showing the clutch mechanism in two different positions; Fig. 18 is an enlarged sectional detail of the clutch mechanism; Fig. 19 is a face view of certain portions of the clutch mechanism; and Fig. 20 is an enlarged detail of the clutch bolt and the members for retracting it and holding it in retracted position.

The machine comprises a base 5 and a support 6 of any suitable shape and construction; and suitably mounted in the frame is a drive shaft 7, which operates a die member 8 and is driven by any suitable means. It might at this time be stated that the general type of machine here illustrated is the same as that shown and described in Patent No. 970,092, issued to Charles D. McDonald on September 13, 1910, and the details of construction of the portions of the machine, other than those to which the present invention relates, will not be gone into.

The drive shaft 7 has secured adjacent one end thereof a gear 9, which is secured to said shaft in a manner whereby it may be readily removed and another one inserted in its place. Upon said shaft and to the outside of the gear 9 is secured a slotted disk 10, to which is connected a rod 11 operatively connected to the feed bar. The gear 9 meshes with a gear 12 mounted upon a

swinging arm 13, the arm having a slot and bolt connection with a plate 14 secured to a standard or support 15. The gear 12 in turn meshes with a gear 16 suitably mounted upon a shaft 17; and secured to this shaft are a plurality of cams 17ª, one of which actuates the feeding mechanism, and the other of which actuates the discharging mechanism. Said feeding and discharging mechanisms may be similar to those shown in Letters Patent No. 970,092 above referred to and will, therefore, not be described in detail. It is obvious, however, that there is a relative speed relation between the drive shaft 7 and the driven shaft 17, due to the varying sizes of the gears 9, 12 and 16.

In the arrangement shown in Fig. 1 of the drawings, the highest speed of the delivering mechanism and the discharge mechanism will be obtained; that is to say, the fewest number of revolutions of the drive shaft will operate said delivery and discharge mechanisms. If a smaller sized gear were put in place of the gear 9, obviously, the number of revolutions of the drive shaft which would be necessary before the shaft 17 made a complete rotation would be increased, and hence the timing of the rotation of the drive shaft with respect to the rotation of the shaft 17 would be changed.

In die press work a change in the timing of the delivery and discharge mechanisms is very important. For instance, if a blank of material is being used upon which the die member acts six times, after the initial delivery of the work, the feeding mechanism must act six times and the die mechanism act six times before the discharge takes place. Hence there must be six actuations of the drive shaft or the shaft 7 to one actuation of the shaft 17. If, however, the style of work is changed, and work acted upon which can only accommodate three operations of the die, then the speed relation or timing between the shaft 7 and the shaft 17 must be changed. In the present construction, when it is desired to make such a change, the gear 9, which is then in position, is removed and another gear put in its place. The gear 12, being secured to an adjustable mounting, can be moved so as to bring its teeth into mesh with the gear 9 in place upon the drive shaft and the gear 17.

It might be noted that the axial center of the arm or mounting 13 is the axial center of the gear 16; hence the teeth of the gear 12 are constantly in mesh with the teeth of the gear 16, but by adjusting the positions of the arm 13, the gear 12 can be brought into mesh with the gear upon the drive shaft, whatever size this latter gear may be. Thus, by this construction a simple and efficient means for changing the timing of the drive shaft with respect to the actuation of the delivery and discharge mechanisms can be easily and quickly accomplished by the substitution of one gear of the set of gears for another.

The work is lifted from a suitable table 18 by suction cups 19, and when raised to a certain height by these cups, a finger 20 actuates to force the work into a channel 21, best illustrated in Figs. 4 and 5. This constitutes a delivery mechanism, which is fully described and shown in Patent No. 970,092 hereinbefore referred to, and a detailed description thereof will not be entered into at this time. The channel 21 is shown as provided with a flaring mouth or inlet 22, and is further shown widened at intervals as at 23. The widened portion is provided in order to accommodate a rod or bar 24, which extends longitudinally of said channel and serves as a stop member, so that when the work is fed into the channel 21 its movement inward will be arrested by this rod. This is provided because of the fact that in dealing with short widths of work the fingers 20 may not force the work clear to the lower edge of the channel, and hence the work would have no firm surface for the lower edge to rest on while being fed, and therefore might twist to a greater or less degree. By utilizing the rod or bar 24, a surface is provided against which the short width work may rest; and if a wider piece of work is being used, the rod 24 may be withdrawn from the upper of the series of enlargements and placed in the lower, thus enabling the wider piece of work to enter the channel the desired distance. The rod or bar 24 in fact constitutes the lower wall of the channel, but, if desired, said bar may be entirely removed and the lower wall of the lower enlargement 23 serve as the lower wall of the channel.

By referrring to Figs. 4 and 5, it will be seen that a channel 25 is provided, which may be said to extend at approximately right angles to the channel 21, and this latter channel 25 serves to accommodate a feed bar 26, best shown in Figs. 3, 7 and 8. The feed bar has formed therein a T-shaped or otherwise configured slot 27, and a series of blocks 28 are each provided with a configured depending portion 29 adapted to travel in said slot. In the form shown in the drawings, the depending portions are in the form of a nut 29ª secured to the block by suitable fastening members 29ᵇ, and the feed bar in turn reciprocates in a groove 30 of a plate 31, best shown in Fig. 6. Each block has thereon a suitable finger or feed member 33 held normally projected upward by a spring 34.

If the movement of the feed bar is increased, which can be readily accomplished by adjustment of the rod 11 in the slot of the disk 10, the fingers or feed members will have to be set in correspondence with this

movement; that is, if a movement of three inches is given to the feed bar, the ends of the fingers should be spaced three inches apart. If, however, the movement of the feed bar is increased to five inches, then the distance between the fingers should be increased proportionately. By arranging the bar in the manner described, this adjustment of the fingers can be readily accomplished, thus eliminating the use of several bars having different spacings of the feed members. It will be readily understood that the adjustment can be made in the form shown by simply loosening the locking member 29[b] and sliding the blocks 28 to the position necessary to effect a proper spacing thereof.

The feed bar is reciprocated by a bell-crank lever 35, the bar being connected with the lever by a suitable arm or link 36. The end of the link is in the form of a spring-pressed clamp 37, consisting of a pivoted arm 38 held downward by spring pressure. The link 36 and the arm 38 are each grooved to receive a pin 39 extending from the bell-crank lever 35. The tension of the spring is such as to exert a pressure upon the arm 38 which is sufficient to insure the retention of an engagement between the link and the bell crank lever during the ordinary operation of the feed mechanism; that is, the strain incident to the feeding of the material will not be sufficient to pull the end of the arm 38 out from engagement with the pin 39. When undue strain, however, is placed on the feed bar, by reason of a bending of the material or other obstruction to the feeding operation, the end of the arm 38 will pull away from the pin 39 and thus break the connection between the link 36 and the bell crank lever. In this manner the further actuation of the machine will not affect the feed bar, so that the stoppage of the feed bar by an obstruction will not result in a forcing or straining of the other parts of the machine, as frequently happens, such a forcing and straining often resulting in a breaking or bending of the parts so as to prevent future use of the machine until proper repairs have been made.

In machines of this nature, there is universally employed means for applying a friction brake mechanism to the drive shaft to prevent rotation of the drive shaft after it has been unclutched from the driving means. The obvious reason for this is to stop the movement of the operative portion of the machine after the unclutching operation. In machines of this nature, it has been customary to apply this friction to the drive shaft at all times. This has been found to be objectionable, in that the resultant wear both to the brake mechanism and the shaft is considerable; and, furthermore, the drag resulting from the constant application of the friction impairs the easy working of the machine and requires a greater driving power.

As heretofore stated, one of the principal objects of the present invention is to time the movements of this brake member so that it will be brought out of engagement with the drive shaft just prior to the clutching of the drive shaft with the drive member, and will be brought into engagement with the drive shaft just after the unclutching of the drive member from the drive shaft, permitting the brake member to accomplish the desired result, namely, stopping the shaft when the drive member is unclutched, but eliminating the objectionable feature of having the brake in constant engagement with the shaft while the shaft is being rotated.

The clutch mechanism is best illustrated in Figs. 18, 19 and 20. This clutch mechanism is old in the art and no claim of novelty is based upon it in the present application. The clutch member consists of a bolt 40, which is held within a recess 41 of a fly wheel or other driving member 42. The bolt is held normally projected by a tension member 43. Located below the bolt is a locking member 44 having a shoulder 45 adapted to be engaged by a cam face 46 on a head 47 (see Figs. 9 and 10). The function of the cam face 46 is to depress the locking member 44 against the force of a spring 48 when it is desired to release the bolt 40. The head 47 is further provided with a cam face 49, which engages with a shoulder 50 on the bolt 40. When the head 47 is raised into proper position, the engagement of the cam face 49 with the shoulder 50 will force the bolt 40 backward in the recess 41; and at the same time the cam face 46 will permit the locking member 44 to rise so that the outer face of the bolt 40 lies behind a shoulder 51 on the locking member, and the bolt is thus held in retracted position, as shown in Fig. 18. When a release of the locking member is desired, the head 47 is drawn downward, pulling the locking member out of engagement with the bolt 40 and allowing said bolt to be projected by the spring 43 into locking position; and in said locking position it enters a suitable recess in a member attached to the drive shaft. This clutch mechanism, however, as heretofore stated, is old in the art and no claim as to novelty is made therefor.

The friction brake mechanism is in the form of a shoe 52, best shown in Figs. 2 and 15, which is of suitable configuration to embrace the drive shaft or a member attached thereto. The clutch mechanism has connected thereto a rod 62, which is joined to a collar 54, said collar in turn being connected to an arm 55 pivoted at 56 (see Fig. 1); and extending from this pivot is a lever 57 joined to a link 58 connected to a foot le-

ver 59. The collar 54 has projecting therefrom a pin 60 traveling in a slot 61 formed in a stem 53 connected to the brake; and extending longitudinally in said slot is a screw-threaded stem 63. Said slot and pin form the connection between the brake mechanism and the clutch mechanism, and it is the lost motion provided for in this connection which times the movements of the brake mechanism so as to have it act at proper periods with respect to the actuation of the clutch mechanism. This is brought about as follows: When it is desired to operate the machine, the foot lever 59 is tripped and by spring action brought into the position shown in Fig. 1. It might be stated at this time that the foot lever is held in depressed position by a pin 64 (see Fig. 1), the arrangement and construction of this pin being clearly shown in Letters Patent No. 970,092, above referred to. When the foot lever is thrown into the position shown in Fig. 1, the arms 57 and 55 are rocked to throw the collar 54 upward, such upward movement elevating the rod 62 and throwing the clutch head 47 into operative position. After the rod 62 has gone upward a predetermined distance, the pin 60 will engage the upper end of the slot 61, thus carrying up the rod 53 and lifting the brake 52 to engage the drive shaft. The brake, however, will have been set before the unclutching operation is performed, owing to the spring pressure thereon, although from a study of the drawings, it will be readily seen that the interval between the setting of the brake mechanism and the unclutching of the clutch mechanism is very short.

When it is desired to operate the machine, the foot lever 59 is drawn downward, depressing the arm 55, drawing downward the rod 62, and drawing the clutch head 47 out of engagement. After the rod 62 has been depressed a predetermined distance, the pin 60 will engage the head of the stem 63, and a further movement of the rod 62 will simultaneously move the rod 53. This downward movement of the rod 53 will draw down the brake 52 and effect a release of the brake mechanism. It will thus be seen that the brake mechanism will be released just after the setting of the clutch mechanism, although the time between these operations will be comparatively short. It is obvious that by adjusting the stem 63 the timing between the actuation of the clutch mechanism and the brake mechanism can be varied as desired.

The operation is as follows: When the foot lever is depressed, the drive shaft is rotated, reciprocating the die head 8. The delivery and discharge mechanisms are actuated by the movements of the cams upon the shaft 17 through the medium of the gears 9, 12 and 16. At the same time the feed bar is reciprocated by the actuation of the disk 10 and the rod 11, and the work fed through the machine in a manner to be acted upon by the dies.

I claim:

1. In a machine of the class described, the combination of delivery and discharge mechanisms for the work, die press mechanism, a drive shaft, a driven shaft, an operative connection between the driven shaft and the delivery and discharge mechanisms, one end of one of said shafts being arranged to permit of the positioning thereon of different sized gears, the size of said gear timing the movements of said delivery and discharge mechanisms, a gear on the other of said shafts, a shiftable gear connecting the gears of the drive shaft and the driven shaft, and an operative connection between the drive shaft and die press mechanism, substantially as described.

2. In a machine of the class described, the combination of delivery and discharge mechanisms for the work, driving, driven, and interchangeable gears, an operative connection between said gears and mechanisms, mountings for said gears, one of said mountings being arranged to permit of the positioning of different sized gears thereon, means for adjusting the mounting of at least one of said gears to bring all of the gears to mesh, the size of said positioned gear determining the timing of the delivery and discharge mechanisms, die mechanism, and means operatively connected for actuating said die mechanism, substantially as described.

3. In a machine of the class described, the combination of delivery and discharge mechanisms for the work, die press mechanism, a drive shaft, a driven shaft, an operative connection between said driven shaft and the delivery and discharge mechanisms, one end of one of said shafts being arranged to permit of the positioning of different sized gears to vary the timing of the movements of the delivery and discharge mechanisms, a gear connecting the gears on the drive and driven shafts, a swinging arm carrying said connecting gear, means for locking said arm in position to bring said connecting gear into mesh with the gears of the drive and driven shafts, and an operative connection between the drive shaft and die mechanisms, substantially as described.

4. In a machine of the class described, the combination of delivery and discharge mechanisms for the work, die press mechanism, a drive shaft, a driven shaft, operative connections between said shafts and mechanisms, gears on the ends of said shafts, one end of one of said shafts being arranged to permit of the positioning of different sized gears thereon, whereby the timing of the movements of the delivery and discharge

mechanisms may be varied, a gear connecting the gears of the drive and driven shafts, a swinging arm carrying said connecting gear, a stationary support, and a slot and bolt connection between said arm and support, substantially as described.

5. In a machine of the class described, the combination of feed mechanism and discharge mechanism for the work, die press mechanism, means for operating said mechanisms, and connecting means between the feed mechanism and its operating means, adapted to be forced from operative engagement under the force of a strain greater than the force incident to the ordinary feeding operation, whereby the feed of the machine is stopped, substantially as described.

6. In a machine of the class described, the combination of feed mechanism and discharge mechanism for the work, die press mechanism, means for operating said mechanisms, and means connecting the feed mechanism and its operating means, held in connecting engagement by a spring pressure of excess strength to the ordinary strength of strain incident to the feeding operation, substantially as described.

7. In a machine of the class described, the combination of feed mechanism and discharge mechanism for the work, die press mechanism, means for operating said mechanisms, and a connection between said feed mechanisms and operating means, comprising spring-pressed jaws held in connecting position by a spring pressure greater than the ordinary force of the strain incident to the feeding operation, substantially as described.

8. In a machine of the class described, the combination of a structure having a channel to receive the work, feed mechanism operating in said channel, means operatively connected for actuating said feed mechanism, discharge mechanism, and die press mechanism, means for operating the same, and means for adjusting the lower wall of said feed channel to vary the depth of the channel to accommodate work of various breadths, substantially as described.

9. In a machine of the class described, the combination of a structure having a channel to receive the work, feed mechanism operating in said channel, means operatively connected for actuating said feed mechanism, discharge mechanism, and die press mechanism, means for operating the same, and a removable bar forming the lower wall of said feed channel, substantially as described.

10. In a machine of the class described, the combination of a structure having a channel widened at intervals and adapted to receive the work, feed mechanism operating in said channel, means operatively connected for actuating said feed mechanism, discharge mechanism, and die press mechanism, means for operating the same, and a bar forming the lower wall of said feed channel and adapted to be inserted in any selected one of said widened portions, substantially as described.

11. In a machine of the class described, the combination of a feed bar, provided with a series of projecting feed members, means for adjusting said members longitudinally of the bar, means operatively connected for actuating said bar, discharge mechanism, and die press mechanism, and means for operating said mechanisms, substantially as described.

12. In a machine of the class described, the combination of a feed bar, provided with a series of feed members, a block upon which each member is mounted, said blocks being movable longitudinally of the bar, means for locking the blocks in desired position, means operatively connected for actuating said bar, discharge and die press mechanisms, and means for operating said mechanisms, substantially as described.

13. In a machine of the class described, the combination of a feed mechanism, comprising a slotted bar, a series of blocks adapted to slide longitudinally in said slot, a feed member on each block, means for locking said blocks in adjusted position, discharge and die press mechanisms, and means for operating said feed, discharge, and die mechanisms, substantially as described.

14. In a machine of the class described, the combination of feed mechanism, comprising a bar having a T-shaped slot therein, a series of blocks, each provided with a T-shaped head adapted to travel in said slot, a feed member on each block, means for locking said heads to the walls of said slot, whereby the feed members are locked in desired position, discharge and die press mechanisms, and means operatively connected for actuating the feed, discharge and die mechanisms, substantially as described.

15. In a machine of the class described, the combination of feed mechanism, comprising a bar having a T-shaped slot, a series of blocks provided with T-shaped heads adapted to travel in said slot, a feed member on each block, a screw-threaded member entered through said block and into said head, for locking said block and head in desired position longitudinally of said slot, discharge and die press mechanisms, and means operatively connected for actuating said mechanisms, substantially as described.

16. In a machine of the class described, the combination of a slotted member, a feed bar within said member, means operatively connected for reciprocating the feed bar, a series of feed members on said bar, a work-receiving channel extending at right angles to the feed bar slot, means for adjusting the

lower wall of said channel, die press mechanism, mechanism for discharging the work from the machine, and means operatively connected for actuating said mechanisms, substantially as described.

17. In a machine of the class described, the combination of a slotted member, a feed bar within said member, means operatively connected for reciprocating the feed bar, a series of feed members on said bar, means for adjusting the members longitudinally of said bar, a work-receiving channel extending at right angles to the feed bar slot, means for adjusting the lower wall of said channel, die press mechanism, mechanism for discharging the work from the machine, and means operatively connected for actuating said mechanisms, substantially as described.

18. In a machine of the class described, the combination of a slotted member, a feed bar within said member, means operatively connected for reciprocating the feed bar, a series of blocks mounted to slide on said bar, a feed member on each block, means for securing the block in desired position upon the bar, a work-receiving channel extending at right angles to the feed bar slot, means for adjusting the lower wall of said channel, die press mechanism, mechanism for discharging the work from the machine, and means operatively connected for actuating said mechanisms, substantially as described.

19. In a machine of the class described, the combination of a slotted member, a feed bar within said member, means operatively connected for reciprocating the feed bar, a series of feed members on said bar, a connection between the feed bar and the actuating means therefor, adapted to be forced from connecting position under the force of undue strain, a work-receiving channel extending at right angles to the feed bar slot, means for adjusting the lower wall of said channel, die press mechanism, mechanism for discharging the work from the machine, and means operatively connected for actuating said mechanisms, substantially as described.

20. In a machine of the class described, the combination of a drive shaft, feed, discharge, and die press mechanisms, a connection between said drive shaft and mechanisms, driving means for the drive shaft, means for clutching and unclutching the drive shaft and driving means, frictional brake means for the drive shaft, and means for applying said brake means just prior to the unclutching of the drive shaft and driving means, and for releasing said brake means just after the clutching of the drive shaft and driving means, substantially as described.

21. In a machine of the class described, the combination of a drive shaft, feed, discharge, and die press mechanisms, a connection between said drive shaft and mechanisms, driving means for the drive shaft, means for clutching and unclutching the drive shaft and driving means, frictional brake means for the drive shaft, means for applying said brake means just prior to the unclutching of the drive shaft and driving means, and for releasing said brake means just after the clutching of the drive shaft and driving means, and means for adjusting the timing of the movements of the brake means with respect to the movements of the clutch mechanism, substantially as described.

22. In a machine of the class described, the combination of a drive shaft, feed, discharge, and die press mechanisms, a connection between said drive shaft and mechanisms, driving means for the drive shaft, clutch mechanism for uniting the drive shaft and driving means, frictional brake means for the drive shaft, and a lost-motion connection between the brake means and the clutch mechanism, whereby said brake mechanism is brought to engaging position just prior to the releasing of the clutch mechanism, and released from engaging position just after the engagement of the clutch mechanism, substantially as described.

23. In a machine of the class described, the combination of a drive shaft, feed, discharge, and die press mechanisms, a connection between said drive shaft and mechanisms, driving means for the drive shaft, clutch mechanism for uniting the drive shaft and driving means, frictional brake means for the shaft, rods extending from the clutch mechanism and brake means, and a pin and slot connection between said rods to permit of lost-motion between the movements thereof, whereby said brake means are brought to engaging position just after the releasing of the clutch mechanism, and released from engaging position just after the engagement of the clutch mechanism, substantially as described.

24. In a machine of the class described, the combination of a drive shaft, feed, discharge, and die press mechanisms, a connection between said drive shaft and mechanisms, driving means for the drive shaft, clutch mechanism for uniting the drive shaft and driving means, frictional brake means for the drive shaft, a lost-motion connection between the brake means and the clutch mechanisms, whereby said brake mechanism is brought to engaging position just prior to the release of the clutch mechanism, and released from engaging position just after the engagement of the clutch mechanism, and means for adjusting the degree of said lost-motion, substantially as described.

25. In a machine of the class described, the combination of a drive shaft, feed, discharge, and die press mechanisms, a connection between said drive shaft and mechanisms, driving means for the drive shaft,

clutch mechanism for uniting the drive shaft and driving means, frictional brake means for the shaft, rods extending from the clutch mechanism and brake means, a pin and slot connection between said rods, to permit of lost-motion between the movements thereof, whereby said brake means are brought to engaging position just prior to the release of the clutch mechanism, and released from engaging position just after the engagement of the clutch mechanism, and means for varying the length of the slot to adjust the degree of lost-motion between the rods, substantially as described.

26. In a machine of the class described, the combination of a drive shaft, feed, discharge, and die press mechanisms, a connection between said drive shaft and mechanisms, driving means for the drive shaft, clutch mechanisms for uniting the drive shaft and driving means, friction brake means for the drive shaft, rods depending from said brake means and clutch mechanism, a slot in one of said rods, a pin on the other rod, adapted to travel within said slot, whereby a lost-motion is provided between the rods to time the movements of the clutch mechanism and brake mechanism, and a stem projecting into the slot and extending lengthwise thereof, said stem being adjustable to vary the length of said slot and control the amount of lost-motion between the rods, substantially as described.

27. In a machine of the class described, the combination of a drive shaft, clutch mechanism for said shaft, brake mechanism for said shaft, means for actuating said mechanisms to provide an intervening period between the movements of said mechanisms, die press mechanism, discharge mechanism, feed mechanism, and an operative connection between said shaft and mechanisms, substantially as described.

28. In a machine of the class described, the combination of a drive shaft, clutch mechanism for said shaft, brake mechanism for said shaft, actuating means therefor, a lost-motion connection between one of said mechanisms and the actuating means, die press mechanism, discharge mechanism, feed mechanism, and an operative connection between said shaft and mechanisms, substantially as described.

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Witnesses:
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CHAS. E. ENNES.